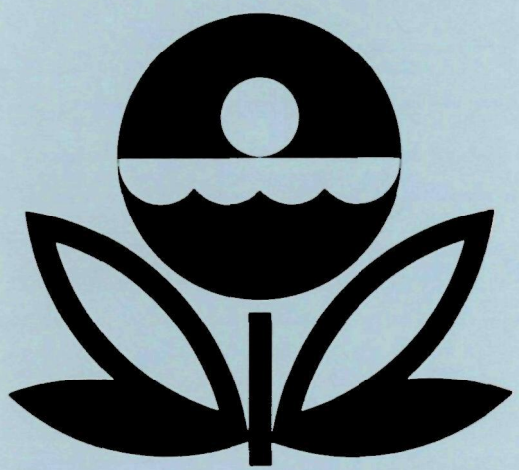
U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES



REPORT

ON

SEMINOE RESERVOIR

CARBON COUNTY

WYOMING

EPA REGION VIII

WORKING PAPER No. 890

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON

and

ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

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REPORT
ON
SEMINOE RESERVOIR
CARBON COUNTY
WYOMING
EPA REGION VIII
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WITH THE COOPERATION OF THE
WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
AND THE
WYOMING NATIONAL GUARD
AUGUST, 1977

CONTENTS

FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Wyoming Department of Environmental Quality for professional involvement, to the Wyoming National Guard for conducting the tributary sampling phase of the Survey, and to those Wyoming wastewater treatment plant operators who voluntarily provided effluent samples.

The staff of the Water Quality Division provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

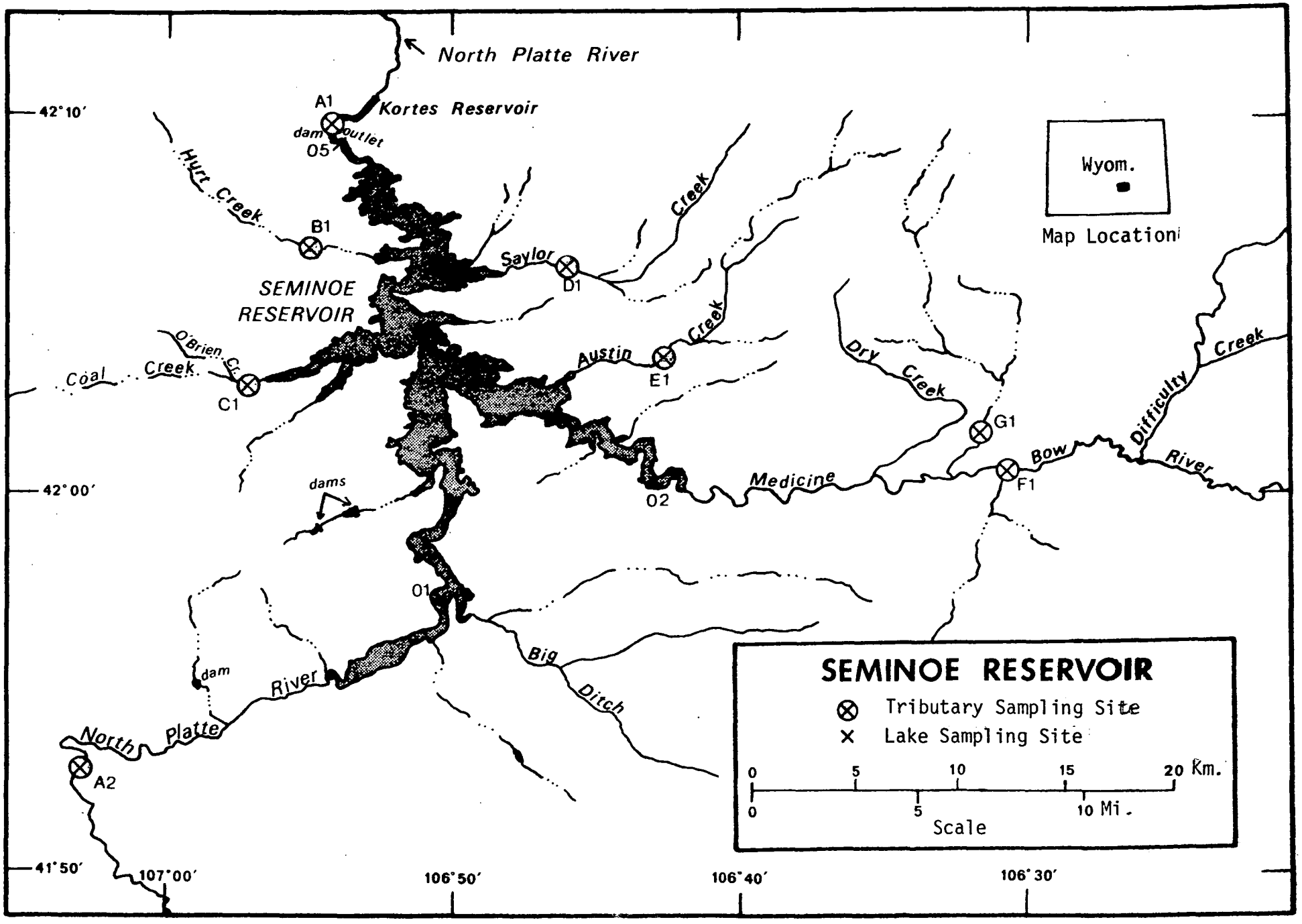
Brigadier General James L. Spence, The Adjutant General of Wyoming, and Project Officer Colonel Donald L. Boyer, who directed the volunteer efforts of the Wyoming National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

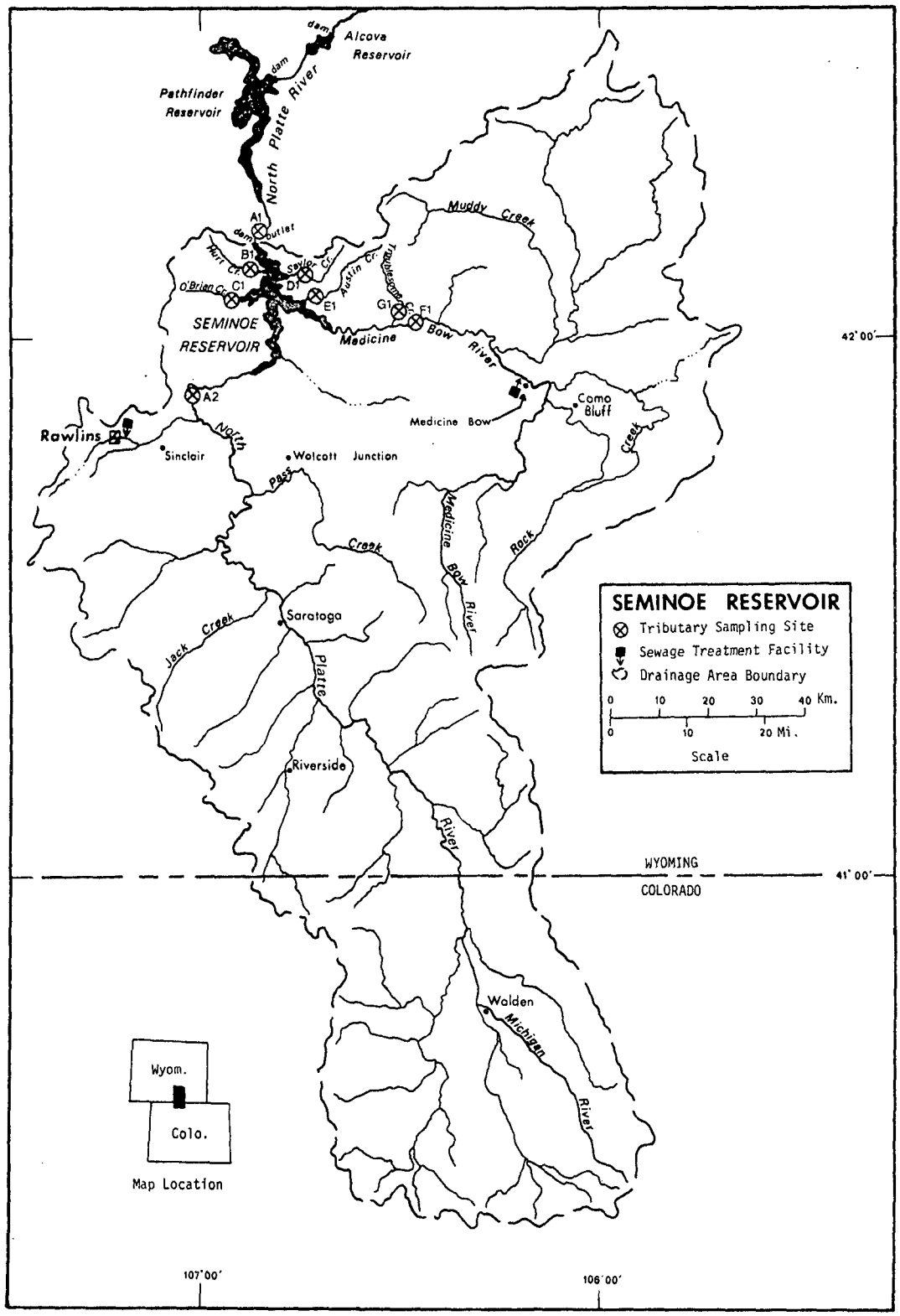
NATIONAL EUTROPHICATION SURVEY

STUDY RESERVOIRS

State of Wyoming

NAME	COUNTY
Big Sandy	Sublette, Sweetwater
Boulder	Sublette
Boysen	Fremont
De Smet	Johnson
Flaming Gorge	Sweetwater, WY; Daggett, UT
Fremont	Sublette
Glendo	Converse, Platte
Keyhole	Crook
Ocean	Fremont
Seminoe	Carbon
Soda	Sublette
Viva Naughton	Lincoln
Woodruff Narrows	Uinta
Yellowtail	Bighorn, WY; Bighorn, Carbon, MT


North Platte River
Kortes Reservoir
A1
dam
outlet
O5
Hurt Creek
B1
SEMINOE
RESERVOIR
Saylor Creek
D1
Austin Creek
E1
O'Brien Cr.
Coal Creek
C1
dams
O2
Medicine Bow River
Dry Creek
G1
F1
Difficulty Creek
O1
Big Ditch
dam
River
North Platte
A2
42°10′
42°00′
41°50′
107°00′
106°50′
106°40′
106°30′
Wyom.
Map Location
SEMINOE RESERVOIR
Tributary Sampling Site
Lake Sampling Site
0 5 10 15 20 Km.
0 5 10 Mi.
Scale


Alcova Reservoir
dam
Pathfinder Reservoir
dam
North Platte River
Muddy Creek
A1
dam
outlet
B1
Nutt Cr.
Seville Cr.
D1
Austin Cr.
Thompson Cr.
C1
O'Brian Cr.
E1
G1
F1
SEMINOE RESERVOIR
Medicine Bow River
42°00'
A2
Como Bluff
Rawlins
Medicine Bow
North Creek
Sinclair
Wolcott Junction
Pass Creek
Medicine Bow River
Rock Creek
Saratoga
Jack Creek
Platte River
Riverside
WYOMING
COLORADO
41°00'
Walden
Michigan River
SEMINOE RESERVOIR
Tributary Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
0 10 20 30 40 Km.
0 10 20 Mi.
Scale
Wyom.
Colo.
Map Location
107°00'
106°00'

SEMINOE RESERVOIR

STORET NO. 5610

I. CONCLUSIONS

A. Trophic Condition:

Seminoe Reservoir ranked fourth in overall trophic quality among the 14 Wyoming lakes and reservoirs sampled in 1975 when compared using a combination of six water quality parameters*. However, the reservoir data indicate that this relatively long water body (ca. 38 km) is eutrophic at stations 1 and 2 (the North Platte River and Medicine Bow River embayments), moderately eutrophic at station 3, and mesotrophic at stations 4 and 5 nearest the dam.

At stations 1 and 2, spring and fall mean total phosphorus ranged from 29 to 461 µg/l; mean dissolved orthophosphorus ranged from 4 to 32 µg/l; mean inorganic nitrogen ranged from 90 to 340 µg/l; mean chlorophyll a ranged from 1.7 to 7.7 µg/l; and mean Secchi disc transparency ranged from 0.2 to 0.8 meters. No depression of dissolved oxygen with depth occurred at any of the sampling times. Survey limnologists noted that the water was very turbid.

At station 3, spring and fall mean total phosphorus ranged from 26 to 47 µg/l; mean dissolved orthophosphorus ranged from 7 to 12 µg/l; mean inorganic nitrogen ranged from 110 to 220 µg/l; mean chlorophyll a ranged from 1.5 to 1.9 µg/l; and mean Secchi disc transparency ranged from 0.5 to 0.3 meters.

No significant depression of dissolved oxygen with depth occurred at any of the sampling times.

At stations 4 and 5, spring and fall mean total phosphorus ranged from 18 to 48 µg/l; mean dissolved orthophosphorus ranged from 5 to 11 µg/l; mean inorganic nitrogen ranged from 100 to 270 µg/l; mean chlorophyll a ranged from 0.8 to 1.6 µg/l; and mean Secchi disc transparency ranged from 0.8 to 3.0 meters. No significant dissolved oxygen depression with depth occurred at any of the sampling times.

B. Rate-Limiting Nutrient:

The algal assay results indicate the reservoir was phosphorus limited at the times the samples were collected (05/16/75 and 10/16/75). The overall reservoir data indicate phosphorus limitation in May and October but nitrogen limitation in August (08/27/75). However, because of high turbidity during much of the sampling year (particularly at stations 1, 2, and 3), primary productivity in the reservoir may be light-limited at times rather than nutrient-limited as indicated by the low to moderate chlorophyll a levels and phytoplankton numbers (page 7).

C. Nutrient Controllability:

1. Point sources--During the sampling year, point sources accounted for 3.0% of the total phosphorus input to Seminoe Reservoir. The wastewater treatment plant at Rawlins contributed

most of the load, and the facility at Medicine Bow contributed less than 0.1%

The present phosphorus loading of 2.91 $g/m^2/yr$ is almost three times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 15). It is calculated that the present phosphorus loading would have to be reduced by 66% to equal the eutrophic level. It is apparent that non-point nutrient control, as well as point-source control, would have to be considered, particularly if land conservation measures are initiated in the drainage basin which could reduce suspended sediments and the resultant turbidity in the reservoir.

2. Non-point sources--Non-point sources contributed 97% of the total phosphorus load during the sampling year. The North Platte River contributed 60.7%, Medicine Bow River contributed 23.0%, and four other gaged tributaries collectively contributed 2.5%. The ungaged minor tributaries and immediate drainage contributed an estimated 10.2%.

Water use in the drainage basin primarily is for irrigation. It has been reported that 17,402 hectares (43,000 acres) are irrigated with water from the Medicine Bow River, and 87,009 hectares (215,000 acres) are irrigated with water from the North Platte River (Anonymous, 1975). Any significant reduction in the nutrient load to the reservoir probably would involve control of nutrients in irrigation return flows. Further investigation is needed to determine the controllability of such nutrients.

II. RESERVOIR AND DRAINAGE BASIN CHARACTERISTICS†

A. Morphometry††:

1. Surface area: 48.77 kilometers^2.
2. Mean depth: 25.6 meters.
3. Maximum depth: 89.9 meters.
4. Volume: 1,248.512 x 10^6 m^3.
5. Mean hydraulic retention time: 342 days (based on outflow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
North Platte River	21,067.1	31.120
Hurt Creek	103.6	0.042
Saylor Creek	54.4	0.160
Austin Creek	69.9	0.359
Medicine Bow River	6,055.4	4.910
Troublesome Creek	134.7	0.242
Minor tributaries & immediate drainage -	1,445.6	6.476
Totals	28,930.7	43.309**

2. Outlet -

North Platte River	28,979.5***	42.280

C. Precipitation****:

1. Year of sampling: 40.8 centimeters.
2. Mean annual: 29.6 centimeters.

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† Table of metric conversions--Appendix B.
†† Prior, 1974.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Sum of inflows adjusted to equal outflow plus evaporation.
*** Includes area of reservoir.
**** See Working Paper No. 175.

III. WATER QUALITY SUMMARY

Seminoe Reservoir was sampled three times during the open-water season of 1975 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from a number of depths at five stations on the reservoir (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first and last visits, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 10.7 meters at station 1, 4.3 meters at station 2, 30.8 meters at station 3, 37.5 meters at station 4, and 47.2 meters at station 5.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR SEMINOLE RESERVOIR
STORET CODE 5610

	1ST SAMPLING (5/19/75) 5 SITES			2ND SAMPLING (8/27/75) 5 SITES			3RD SAMPLING (10/16/75) 5 SITES		
PARAMETER	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN
TEMP (C)	4.9 - 11.8	7.3	7.1	10.6 - 17.1	14.8	15.7	10.4 - 14.4	13.3	13.6
DISS OXY (MG/L)	7.0 - 10.0	8.7	9.0	4.0 - 8.0	6.4	6.6	7.0 - 8.6	7.7	7.6
CNDCTVY (MCROMO)	152. - 364.	318.	337.	300. - 617.	375.	351.	265. - 444.	287.	275.
PH (STAND UNITS)	7.6 - 8.2	8.1	8.1	7.7 - 8.5	8.1	8.1	8.1 - 8.4	8.2	8.2
TOT ALK (MG/L)	76. - 128.	113.	120.	100. - 123.	109.	105.	100. - 128.	108.	105.
TOT P (MG/L)	0.018 - 0.461	0.071	0.030	0.014 - 0.047	0.031	0.030	0.023 - 0.053	0.032	0.030
ORTHO P (MG/L)	0.005 - 0.039	0.012	0.007	0.003 - 0.020	0.012	0.012	0.004 - 0.011	0.007	0.007
NO2+NO3 (MG/L)	0.100 - 0.230	0.176	0.200	0.020 - 0.240	0.110	0.090	0.020 - 0.100	0.074	0.080
AMMONIA (MG/L)	0.030 - 0.090	0.050	0.040	0.020 - 0.040	0.024	0.020	0.020 - 0.280	0.048	0.020
KJEL N (MG/L)	0.300 - 1.100	0.528	0.500	0.200 - 0.700	0.300	0.200	0.200 - 0.600	0.356	0.400
INORG N (MG/L)	0.180 - 0.270	0.226	0.230	0.040 - 0.260	0.135	0.125	0.090 - 0.340	0.122	0.100
TOTAL N (MG/L)	0.500 - 1.220	0.704	0.660	0.250 - 0.720	0.410	0.410	0.280 - 0.660	0.429	0.420
CHLRPYL A (UG/L)	0.8 - 5.5	2.2	1.5	0.9 - 3.1	2.1	2.3	1.5 - 7.7	3.2	1.7
SECCHI (METERS)	0.2 - 3.0	1.4	0.5	0.4 - 4.3	1.8	1.5	0.6 - 0.9	0.8	0.8

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
05/19/75	1. Chroomonas (?) sp.	306
	2. Gomphonema sp.	109
	3. Synedra sp.	66
	4. Centric diatoms	66
	5. Pennate diatoms	66
	Other genera	87
	Total	700
08/27/75	1. Aphanizomenon sp.	675
	2. Cryptomonas sp.	75
	3. Chroomonas (?) sp.	75
	4. Asterionella sp.	25
	5. Epithemia sp.	25
	Total	877
10/16/75	1. Chroomonas (?) sp.	558
	2. Aphanizomenon sp.	512
	Total	1,070

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
05/19/75	1	5.5
	2	1.7
	3	1.5
	4	1.4
	5	0.8
08/27/75	1	2.7
	2	-
	3	1.9
	4	3.1
	5	0.9
10/16/75	1	7.7
	2	3.5
	3	1.7
	4	1.5
	5	1.6

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. May sample -

(1) Stations 1, 2, and 3 -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.015	0.205	4.4
0.050 P	0.065	0.205	11.4
0.050 P + 1.0 N	0.065	1.205	31.4
1.0 N	0.015	1.205	5.4

(2) Stations 4 and 5 -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	< 0.005	0.225	0.2
0.050 P	< 0.055	0.225	10.8
0.050 P + 1.0 N	< 0.055	1.225	26.2
1.0 N	< 0.005	1.225	0.2

b. October sample -

(1) Stations 1 and 2 -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.005	0.190	0.5
0.050 P	0.055	0.190	8.3
0.050 P + 1.0 N	0.055	1.190	14.3
1.0 N	0.005	1.190	0.5

(2) Stations 3, 4, and 5 -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.005	0.070	0.5
0.050 P	0.055	0.070	2.9
0.050 P + 1.0 N	0.055	1.070	26.4
1.0 N	0.005	1.070	0.5

2. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential primary productivity of Seminoe Reservoir was moderately high at stations 1, 2, and 3 in May and moderate at all other stations at that time and in October as well. Also, in all assays, substantial increases in yields with the addition of phosphorus alone indicate the reservoir was phosphorus limited at those times. Note that the addition of nitrogen alone resulted in yields not significantly greater than those of the controls.

The differences in the control yields at stations 1, 2, and 3 (south end of the reservoir) and stations 3 and 4 (north end of the reservoir) in May indicate the differences in availability of nutrients for primary production. Note that orthophosphorus concentrations at stations 1, 2, and 3 at that time were three times greater than those at stations 4 and 5.

The reservoir data indicate phosphorus limitation in May and October but nitrogen limitation in August; i.e., the mean inorganic nitrogen/orthophosphorus ratios were 19/1 and 17/1 in May and October, respectively, and 11/1 in August. However, the mean N/P ratios at each sampling station and time indicate that stations 1 and 2 tended more towards nitrogen limitation in May and August. Following is a tabulation of the N/P ratios at each of the sampling stations and times with the indicated

limiting nutrient in parentheses.

Station	05/19/75	08/27/75	10/16/75
1	5/1 (N)	9/1 (N)	13/1 (N-?)
2	13/1 (N-?)	8/1 (N)	64/1 (P)
3	20/1 (P)	11/1 (N)	15/1 (P)
4	40/1 (P)	12/1 (N)	11/1 (N)
5	40/1 (P)	14/1 (P)	17/1 (P)

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Wyoming National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page vi), except for the high runoff months of May and June when two samples were collected. Sampling was begun in October, 1974, and was completed in September, 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Wyoming District Office of the U.S. Geological Survey for the tributary sites nearest the reservoir.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads at stations B-1, D-1 and E-1, in $kg/km^2/year$, and multiplying the means by the ZZ area in km^2.

The operators of the Medicine Bow and Rawlins wastewater treatment plants provided monthly effluent samples and corresponding flow data.

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* See Working Paper No. 175.

A. Waste Sources:

1. Known municipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Medicine Bow	406	stab. pond	29.1	Medicine Bow River
Rawlins	7,850	none	5,506.3	Sugar Creek

2. Known industrial - None

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
North Platte River	86,050	60.7
Hurt Creek	330	0.3
Saylor Creek	575	0.4
Austin Creek	1,180	0.8
Medicine Bow River	32,595	23.0
Troublesome Creek	1,455	1.0
b. Minor tributaries & immediate drainage (non-point load) -	14,455	10.2
c. Known municipal STP's -		
Rawlins	4,160	3.0
Medicine Bow	45	< 0.1
d. Septic tanks - Unknown	?	-
e. Known industrial - None	-	-
f. Direct precipitation** -	855	0.6
Total	141,700	100.0

2. Outputs -

Reservoir outlet - North Platte River	39,285

3. Net annual P accumulation - 102,415 kg.

* Prior, 1974.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
North Platte River	1,060,330	62.8
Hurt Creek	11,590	0.7
Saylor Creek	6,630	0.4
Austin Creek	14,215	0.8
Medicine Bow River	300,495	17.8
Troublesome Creek	14,540	0.9
b. Minor tributaries & immediate drainage (non-point load) -	211,060	12.5
c. Known municipal STP's -		
Rawlins	16,770	1.0
Medicine Bow	170	< 0.1
d. Septic tanks - Unknown	?	-
e. Known industrial - None	-	-
f. Direct precipitation** -	52,650	3.1
Total	1,688,450	100.0

2. Outputs -

Reservoir outlet - North Platte River	1,634,305

3. Net annual N accumulation - 54,145 kg.

* See Working Paper No. 175.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
North Platte River	4	50
Hurt Creek	3	112
Saylor Creek	11	122
Austin Creek	17	203
Medicine Bow River	5	50
Troublesome Creek	11	108

E. Mean Nutrient Concentrations in Ungaged Stream:

Tributary	Mean Total P Conc. (mg/l)	Mean Total N Conc. (mg/l)
O'Brien Creek	0.072	0.971

F. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	2.91	2.10	34.6	1.1

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Seminoe Reservoir:

"Dangerous" (eutrophic loading)	1.00
"Permissible" (oligotrophic loading)	0.50

V. LITERATURE REVIEWED

Anonymous, 1975. Water resources data for Wyoming. Part 1: Surface water records. U.S. Geol. Surv., Cheyenne.

Prior, Roy E., 1974. Personal communication (reservoir morphometry; point sources). WY Dept. of Env. Qual., Cheyenne.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
5601	BIG SANDY RESERVOIR	0.087	0.060	487.667	4.383	8.800	0.020
5602	BOULDER LAKE	0.008	0.040	361.600	2.483	8.400	0.002
5603	BOYSEN RESERVOIR	0.037	0.140	465.923	5.264	14.400	0.014
5604	LAKE DE SMET	0.033	0.040	409.000	11.167	9.400	0.006
5605	FLAMING GORGE RESERVOIR	0.014	0.605	366.461	5.611	12.200	0.003
5606	FREMONT LAKE	0.006	0.040	-22.000	3.783	7.400	0.002
5607	GLENDO RESERVOIR	0.045	0.315	459.182	8.473	12.600	0.014
5608	KEY HOLE RESERVOIR	0.028	0.050	454.583	7.792	14.000	0.004
5609	OCEAN LAKE	0.043	0.040	478.333	7.500	8.600	0.004
5610	SEMINOLE RESERVOIR	0.030	0.130	447.000	2.536	11.000	0.007
5611	SODA LAKE	0.063	0.040	387.500	5.575	15.000	0.014
5612	VIVA NAUGHTON RESERVOIR	0.065	0.120	430.000	25.067	13.200	0.024
5613	WOODRUFF NARROWS RESERVO	0.069	0.105	470.000	12.950	13.200	0.019
5614	YELLOWTAIL RESERVOIR	0.026	0.310	364.500	5.410	10.000	0.017

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
5601	BIG SANDY RESERVOIR	0 (0)	54 (7)	0 (0)	77 (10)	77 (10)	8 (1)	216
5602	BOULDER LAKE	92 (12)	92 (11)	92 (12)	100 (13)	92 (12)	92 (12)	560
5603	BOYSEN RESERVOIR	46 (6)	23 (3)	23 (3)	46 (6)	8 (1)	42 (5)	168
5604	LAKE DE SMET	54 (7)	73 (9)	62 (8)	15 (2)	69 (9)	62 (8)	335
5605	FLAMING GORGE RESERVOIR	85 (11)	0 (0)	77 (10)	54 (7)	46 (6)	85 (11)	347
5606	FREMONT LAKE	100 (13)	73 (9)	100 (13)	85 (11)	100 (13)	100 (13)	558
5607	GLENDO RESERVOIR	31 (4)	8 (1)	31 (4)	23 (3)	38 (5)	42 (5)	173
5608	KEY HOLE RESERVOIR	69 (9)	62 (8)	38 (5)	31 (4)	15 (2)	69 (9)	284
5609	OCEAN LAKE	38 (5)	92 (11)	8 (1)	38 (5)	85 (11)	77 (10)	338
5610	SEMINOLE RESERVOIR	62 (8)	31 (4)	46 (6)	92 (12)	54 (7)	54 (7)	339
5611	SODA LAKE	23 (3)	92 (11)	69 (9)	62 (8)	0 (0)	31 (4)	277
5612	VIVA NAUGHTON RESERVOIR	15 (2)	39 (5)	54 (7)	0 (0)	27 (3)	0 (0)	134
5613	WOODRUFF NARROWS RESERVO	8 (1)	46 (6)	15 (2)	8 (1)	27 (3)	15 (2)	119
5614	YELLOWTAIL RESERVOIR	77 (10)	15 (2)	85 (11)	69 (9)	62 (8)	23 (3)	331

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	5602	BOULDER LAKE	560
2	5606	FREMONT LAKE	558
3	5605	FLAMING GORGE RESERVOIR	347
4	5610	SEMINOLE RESERVOIR	339
5	5609	OCEAN LAKE	338
6	5604	LAKE DE SMET	335
7	5614	YELLOWTAIL RESERVOIR	331
8	5608	KEY HOLE RESERVOIR	284
9	5611	SODA LAKE	277
10	5601	BIG SANDY RESERVOIR	216
11	5603	BOYSEN RESERVOIR	188
12	5607	GLENDO RESERVOIR	173
13	5612	VIVA NAUGHTON RESERVOIR	134
14	5613	WOODRUFF NARROWS RESERVO	119

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR WYOMING 08/05/76

LAKE CODE 5610 SEMINOE RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 28979.5

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
5610A1	28979.5	14.55	15.29	25.37	58.98	112.19	147.50	44.94	21.75	16.48	17.50	17.27	15.21	42.28
5610A2	21067.1	8.24	9.17	13.68	41.91	87.33	123.63	35.91	13.05	8.30	11.33	11.36	9.34	31.12
5610B1	103.6	0.014	0.014	0.028	0.057	0.085	0.227	0.014	0.014	0.014	0.014	0.014	0.014	0.042
5610D1	54.4	0.028	0.057	0.113	0.283	0.283	0.850	0.057	0.057	0.028	0.057	0.057	0.057	0.160
5610E1	69.9	0.057	0.057	0.113	0.651	0.850	2.265	0.057	0.057	0.057	0.057	0.057	0.057	0.359
5610F1	6055.4	0.82	1.36	3.85	9.03	15.40	18.07	4.56	1.42	0.82	1.16	1.36	1.02	4.91
5610G1	134.7	0.142	0.142	0.198	0.481	0.255	0.850	0.085	0.113	0.142	0.142	0.227	0.142	0.242
5610ZZ	1494.4	0.0	0.0	0.014	0.028	0.057	0.113	0.028	0.014	0.0	0.0	0.0	0.0	0.021

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 28979.5
SUM OF SUB-DRAINAGE AREAS = 28979.5
TOTAL FLOW IN = 442.04
TOTAL FLOW OUT = 507.04

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5610A1	10	74	35.679	7	37.095				
	11	74	48.705	5	33.980				
	12	74	47.855	1	47.289				
	1	75	56.634	6	49.554				
	2	75	39.644	11	32.564				
	3	75	30.299	3	42.192				
	4	75	42.475	4	27.467				
	5	75	30.582	2	49.554	21	34.263		
	6	75	32.564	3	19.255	19	37.095		
	7	75	33.980	7	24.381				
	8	75	27.467	4	23.446				
	9	75	35.679	11	32.281				
5610A2	10	74	10.619						
	11	74	12.658	5	13.762				
	12	74	10.194	1	11.582				
	1	75	8.778	6	8.495				
	2	75	9.061	11	8.778				
	3	75	10.477	3	9.628				
	4	75	29.619	4	13.309				
	5	75	76.455	2	41.059	21	145.832		
	6	75	138.498	3	80.703	19	165.654		
	7	75	91.747	7	157.725				
	8	75	19.369	4	28.883				
	9	75	8.835	11	16.622				

TRIBUTARY FLOW INFORMATION FOR WYOMING 08/05/76

LAKE CODE 5610 SEMINOE RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5610B1	10	74	0.014	7	0.017				
	11	74	0.014	5	0.023				
	12	74	0.014						
	1	75	0.014						
	2	75	0.014						
	3	75	0.017						
	4	75	0.028						
	5	75	0.170	2	0.057				
	6	75	0.113	3	0.170	20	0.085		
	7	75	0.028	7	0.023				
	8	75	0.006						
	9	75	0.008	11	0.006				
5610D1	10	74	0.057						
	11	74	0.057	5	0.057				
	12	74	0.057	1	0.057				
	1	75	0.028						
	2	75	0.057						
	3	75	0.085						
	4	75	0.142						
	5	75	0.566	4	0.227	20	0.963		
	6	75	0.481	3	0.651	19	0.368		
	7	75	0.057	7	0.057				
	8	75	0.057	4	0.057				
	9	75	0.028	11	0.028				
5610E1	10	74	0.057	7	0.057				
	11	74	0.057	5	0.057				
	12	74	0.085						
	1	75	0.311						
	2	75	1.699						
	3	75	1.133						
	4	75	0.085						
	5	75	0.028	4	0.057	20	3.115		
	6	75	0.028	3	1.756	19	0.736		
	7	75	0.057	7	0.142				
	8	75	0.057	4	0.028				
	9	75	0.057	11	0.028				
5610F1	10	74	1.416	7	1.303				
	11	74	1.727	5	1.869				
	12	74	0.821	1	1.189				
	1	75	0.708	7	0.736				
	2	75	0.850						
	3	75	3.851	3	1.274				
	4	75	14.555	4	9.061				
	5	75	14.498	4	8.070	20	23.673		
	6	75	18.406	3	14.951	19	20.048		
	7	75	9.061	7	15.121				
	8	75	1.784	4	1.869				
	9	75	0.850	11	0.680				

TRIBUTARY FLOW INFORMATION FOR WYOMING 08/05/76

LAKE CODE 5610 SEMINOE RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5610G1	10	74	0.142						
	11	74	0.227	5	0.227				
	12	74	0.142	1	0.142				
	1	75	0.142						
	2	75	0.142						
	3	75	0.142						
	4	75	0.227						
	5	75	0.566	4	0.425	20	0.708		
	6	75	0.425	3	0.765	19	0.368		
	7	75	0.113	7	0.198				
	8	75	0.142	4	0.142				
	9	75	0.170	11	0.368				
5610ZZ	10	74	0.0						
	11	74	0.0						
	12	74	0.0						
	1	75	0.0						
	2	75	0.0						
	3	75	0.028						
	4	75	0.028						
	5	75	0.113						
	6	75	0.057						
	7	75	0.057						
	8	75	0.028						
	9	75	0.0						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/08/05

561001
41 56 55.0 107 50 45.0 3
SEMINOLE RESERVOIR
56007 WYOMING

090991

11EPALES 2111202
0013 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/05/19	10 20 0000		11.8	7.0	6	152	7.60	78	0.090	1.100	0.120	0.032
	10 20 0005		11.8	7.0		154	7.65	76	0.080	0.900	0.100	0.038
	10 20 0009		11.8	7.2		156	7.70	78	0.080	0.800	0.100	0.039
75/08/27	13 20 0000		16.0	6.6	42	317	8.10	118	0.040	0.200	0.090	0.012
	13 20 0005		15.7	6.6		313	8.10	119	0.040	0.200	0.090	0.015
	13 20 0015		15.4	6.6		300	8.30	116	0.040	0.400	0.090	0.014
	13 20 0035		14.8	7.2		307	8.30	119	0.040	0.400	0.080	0.014
75/10/16	16 00 0000		12.1	8.4	30	266	8.30	119	0.080	0.500	0.020K	0.007
	16 00 0005		12.1	8.6		269	8.40	119	0.070	0.400	0.020K	0.007
	16 00 0014		11.7	8.2		267	8.40	121	0.070	0.400	0.020K	0.006

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/05/19	10 20 0000		0.227	5.5	
	10 20 0005		0.151		
	10 20 0009		0.461		
75/08/27	13 20 0000		0.035	2.7	
	13 20 0005		0.038		
	13 20 0015		0.030		
	13 20 0035		0.032		
75/10/16	16 00 0000		0.053	7.7	
	16 00 0005		0.039		
	16 00 0014		0.034		

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/05

561002
42 00 13.0 106 43 02.0 3
SEMINOLE RESERVOIR
56007 WYOMING

090991

11EPALES 2111202
0018 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/05/22	10 00	0000	8.2	8.0	6	327	7.80	95	0.070	0.800	0.170	0.015
	10 00	0005	8.2	8.0		324	7.80	95	0.060	0.600	0.140	0.016
	10 00	0014	8.0	8.0		313	8.00	95	0.060	0.600	0.140	0.016
75/08/27	11 30	0000	16.4	8.0	15	564	7.90	110	0.030	0.600	0.020	0.010
	11 30	0005	16.1	7.2		563	8.40	117	0.030	0.500	0.020K	0.005
	11 30	0014	15.6	6.6		617	8.40	123	0.030	0.400	0.020K	0.004
75/10/16	15 25	0000	11.6	8.4		359	8.30	119	0.180	0.500	0.040	0.005
	15 25	0005	11.6	8.6		356	8.30	119	0.180	0.600	0.030	0.004
	15 25	0014	10.4	8.0		444	8.20	128	0.280	0.600	0.060	0.004

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/05/22	10 00	0000	0.139	1.7	
	10 00	0005	0.120		
	10 00	0014	0.121		
75/08/27	11 30	0000	0.041		
	11 30	0005	0.038		
	11 30	0014	0.030		
75/10/16	15 25	0000	0.038	3.5	
	15 25	0005	0.030		
	15 25	0014	0.029		

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/05

561003
42 03 51.0 106 51 01.0 3
SEMINOLE RESERVOIR
56007 WYOMING

090991

11EPALES 2111202
0078 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/05/22	10 25	0000	7.6	9.0	21	337	8.05	115	0.060	0.600	0.160	0.012
	10 25	0005	7.6	8.4		338	8.05	115	0.060	0.500	0.160	0.012
	10 25	0015	7.5	8.4		338	8.00	115	0.060	0.500	0.160	0.011
	10 25	0025	7.5	8.4		339	8.10	117	0.060	0.500	0.160	0.011
	10 25	0050	7.4	8.6		341	8.10	120	0.050	0.500	0.180	0.009
	10 25	0074	6.9	8.8		351	8.10	116	0.050	0.500	0.160	0.010
75/08/27	11 50	0000	16.3	7.6	60	350	8.50	117	0.020K	0.700	0.020K	0.005
	11 50	0005	15.9	7.2		348	8.50	100	0.020	0.400	0.020K	0.006
	11 50	0015	15.8	6.8		351	8.30	102	0.020	0.500	0.030	0.005
	11 50	0050	14.6	5.8		343	8.10	101	0.020K	0.200K	0.110	0.013
	11 50	0075	12.4	4.8		343	7.80	103	0.020K	0.200K	0.210	0.020
	11 50	0101	11.2	4.0		340	7.70	103	0.020	0.200	0.210	0.018
75/10/16	15 00	0000	13.6	7.8	23	283	8.25	105	0.020K	0.200	0.100	0.009
	15 00	0005	13.5	7.8		281	8.25	105	0.020K	0.200	0.100	0.010
	15 00	0015	13.4	7.6		281	8.20	106	0.020K	0.300	0.100	0.008
	15 00	0030	13.4	7.6		281	8.20	106	0.020K	0.400	0.100	0.008
	15 00	0050	13.7	7.6		265	8.20	104	0.020K	0.200	0.100	0.007
	15 00	0075	13.3	8.0		281	8.20	106	0.020K	0.300	0.090	0.007
	15 00	0095	13.2	7.6		293	8.20	106	0.020	0.300	0.090	0.007

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/05

561003
42 03 51.0 106 51 01.0 3
SEMINOLE RESERVOIR
56007 WYOMING
090991

11EPALES 2111202
0078 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/05/22	10 25	0000	0.046	1.5	
	10 25	0005	0.043		
	10 25	0015	0.044		
	10 25	0025	0.047		
	10 25	0050	0.042		
	10 25	0074	0.044		
75/08/27	11 50	0000	0.030	1.9	
	11 50	0005	0.025		
	11 50	0015	0.022		
	11 50	0050	0.029		
	11 50	0075	0.044		
	11 50	0101	0.046		
75/10/16	15 00	0000	0.036	1.7	
	15 00	0005	0.026		
	15 00	0015	0.027		
	15 00	0030	0.032		
	15 00	0050	0.033		
	15 00	0075	0.026		
	15 00	0095	0.037		

STORET RETRIEVAL DATE 76/08/05

561004
42 05 45.0 106 50 43.0 3
SEMINOLE RESERVOIR
56007 WYOMING

090991

11EPALES 2111202
0105 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/05/22	11 00	0000	7.2	9.0	120	358	8.20	125	0.040	0.500	0.200	0.007
	11 00	0005	7.1	9.0		356	8.20	124	0.030	0.400	0.200	0.006
	11 00	0025	6.9	9.0		359	8.20	126	0.040	0.400	0.200	0.005
	11 00	0050	6.7	9.2		358	8.20	126	0.030	0.400	0.200	0.005
	11 00	0075	6.7	9.0		357	8.20	126	0.040	0.500	0.200	0.006
	11 00	0101	6.6	8.8		364	8.20	128	0.040	0.500	0.210	0.007
75/08/27	12 15	0000	16.8	7.2	65	353	8.30	100	0.020K	0.300	0.060	0.006
	12 15	0005	16.5	7.8		351	8.30	101	0.020	0.300	0.040	0.005
	12 15	0015	16.2	7.0		350	8.20	102	0.020K	0.200	0.050	0.005
	12 15	0050	15.6	5.6		342		104	0.020K	0.200	0.180	0.018
	12 15	0080	11.8	5.4		342	7.95	104	0.020K	0.200K	0.180	0.018
	12 15	0118	10.9	5.6		340	7.80	106	0.020K	0.200K	0.210	0.019
75/10/16	14 35	0000	14.3	7.4	30	275	8.25	109	0.020K	0.200	0.080	0.010
	14 35	0005	13.7	7.7		273	8.20	102	0.040	0.400	0.080	0.009
	14 35	0015	13.7	7.8		271	8.20	102	0.020	0.300	0.080	0.008
	14 35	0040	13.7	7.6		273	8.20	102	0.020	0.300	0.080	0.011
	14 35	0075	13.6	7.6		271	8.20	101	0.020K	0.300	0.080	0.010
	14 35	0100	13.5	7.2		271	8.20	102	0.020K	0.200	0.080	0.009
	14 35	0123	13.3	7.6		269	8.20	102	0.020K	0.200	0.080	0.007

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/05

561004
42 05 45.0 106 50 43.0 3
SEMINOLE RESERVOIR
56007 WYOMING
090991

11EPALES 2111202
0105 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/05/22	11	00 0000	0.025	1.4	
	11	00 0005	0.024		
	11	00 0025	0.024		
	11	00 0050	0.022		
	11	00 0075	0.024		
	11	00 0101	0.030		
75/08/27	12	15 0000	0.021	3.1	
	12	15 0005	0.028		
	12	15 0015	0.018		
	12	15 0050	0.031		
	12	15 0080	0.032		
	12	15 0118	0.034		
75/10/16	14	35 0000	0.032	1.5	
	14	35 0005	0.030		
	14	35 0015	0.025		
	14	35 0040	0.023		
	14	35 0075	0.027		
	14	35 0100	0.026		
	14	35 0123	0.037		

STORET RETRIEVAL DATE 76/08/05

561005
42 09 30.0 106 54 25.0 3
SEMINOLE RESERVOIR
56007 WYOMING
090991

11EPALES 2111202
0155 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/05/22	11 30	0000	5.5	10.0	120	338	8.20	127	0.040	0.500	0.210	0.006
	11 30	0005	5.3	9.4		335	8.20	126	0.040	0.400	0.200	0.005
	11 30	0025	5.3	9.4		332	8.20	119	0.040	0.400	0.230	0.007
	11 30	0050	5.2	9.4		332	8.15	122	0.030	0.300	0.200	0.005
	11 30	0075	5.2	9.4		332	8.15	121	0.030	0.300	0.200	0.005
	11 30	0100	5.2	9.4		333	8.15	122	0.030	0.400	0.200	0.006
	11 30	0151	4.9	9.4		330	8.15	122	0.030	0.300	0.200	0.006
75/08/27	12 45	0000	16.9	7.0	168	371	8.20	102	0.020K	0.300	0.050	0.007
	12 45	0005	17.1	6.2		370	8.20	104	0.020	0.200	0.090	0.003
	12 45	0025	16.8	5.6		374	8.00	104	0.020	0.200K	0.100	0.004
	12 45	0050	15.9	6.2		374	7.90	116	0.020K	0.200K	0.240	0.017
	12 45	0085	12.0	6.0		404	7.85	110	0.020K	0.200K	0.220	0.018
	12 45	0120	11.4	5.8		364	7.80	113	0.020K	0.200K	0.220	0.020
	12 45	0155	10.6	5.4		353	7.70	112	0.020K	0.200	0.220	0.020
75/10/16	14 05	0000	14.4	7.2	36	277	8.10	100	0.020K	0.400	0.080	0.006
	14 05	0005	14.2	7.0		277	8.10	101	0.020K	0.400	0.080	0.006
	14 05	0015	14.2	7.4		275	8.10	102	0.020K	0.400	0.080	0.006
	14 05	0050	14.1	7.0		275	8.15	104	0.020K	0.400	0.080	0.006
	14 05	0085	14.2	7.2		277	8.15	103	0.020K	0.400	0.080	0.006
	14 05	0115	14.0	7.2		275	8.15	103	0.020K	0.400	0.080	0.007
	14 05	0140	14.1	7.2		275	8.10	107	0.020K	0.400	0.080	0.007

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/05

561005
42 09 30.0 106 54 25.0 3
SEMINOLE RESERVOIR
56007 WYOMING

090991

11EPALES 2111202
0155 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/05/22	11	30 0000	0.019	0.8	
	11	30 0005	0.020		
	11	30 0025	0.020		
	11	30 0050	0.019		
	11	30 0075	0.020		
	11	30 0100	0.018		
	11	30 0151	0.020		
75/08/27	12	45 0000	0.027	0.9	
	12	45 0005	0.015		
	12	45 0025	0.014		
	12	45 0050	0.027		
	12	45 0085	0.030		
	12	45 0120	0.031		
	12	45 0155	0.047		
75/10/16	14	05 0000	0.024	1.6	
	14	05 0005	0.023		
	14	05 0015	0.030		
	14	05 0050	0.026		
	14	05 0085	0.028		
	14	05 0115	0.034		
	14	05 0140	0.048		

APPENDIX E

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/08/05

5610A1
42 09 18.0 106 54 28.0 4
N PLATTE RIVER
56 7.5 SEMINOE DAM
0/SEMINOE RESERVOIR 090991
BELOW SEMINOE DAM .3 MI E TOWN SEMNO DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/07	11 50		0.136	2.100	0.030	0.010	0.035
74/11/05	10 55		0.144	0.700	0.020	0.020	0.045
74/12/01	12 40		0.140	1.700	0.020	0.010	0.020
75/01/06	12 00		0.160	0.500	0.040	0.007	0.020
75/02/11	10 30		0.216	0.600	0.080	0.016	0.020
75/03/03	10 30		0.240	1.250	0.015	0.020	0.020
75/04/04	12 00		0.240	1.250	0.170	0.005	0.020
75/05/02	11 10		0.191	1.050	0.069	0.010	0.010
75/05/21	15 15		0.210	1.650	0.050	0.005	0.010K
75/06/03	15 00		0.190	0.550	0.025	0.005	0.020
75/06/19	13 50		0.190	0.350	0.042	0.007	0.030
75/07/07	15 00		0.195	0.450	0.045	0.015	0.050
75/08/04	13 28		0.220	0.700	0.032	0.025	0.050
75/09/11	11 30		0.210	1.100	0.025	0.025	0.080

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/05

5610A2
41 52 20.0 107 03 25.0 4
N PLATTE RIVER
56 7.5 SINCLAIR
T/SEMINOE RESERVOIR 090991
BNK BY USGS GAGING STATION ON SEMINOE RD
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/05	09 40		0.024	0.700	0.020	0.015	0.030
74/12/01	10 30		0.016	1.600	0.040	0.010	0.020
75/01/06	11 00		0.032	0.300	0.012	0.005K	0.010K
75/02/11	12 10		0.104	0.500	0.024	0.008	0.020
75/03/03	11 10		0.040	0.800	0.100	0.055	0.090
75/04/04	13 10		0.005	1.300	0.035	0.010	0.030
75/05/02	13 20		0.057	0.800	0.112	0.049	0.100
75/05/21	11 30		0.065	2.100	0.050	0.035	0.230
75/06/03	10 00		0.015	0.700	0.015	0.290	
75/06/19	09 20		0.015	0.650	0.020	0.015	0.070
75/07/07	09 30		0.020	1.650	0.040	0.035	0.140
75/08/04	10 00		0.005	1.300	0.110	0.005	0.030
75/09/11	09 30		0.035		0.020	0.030	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/05

561081
42 06 20.0 106 55 10.0 4
HURT CREEK
56 7.5 SEMNO DAM SW
T/SEMINOE RESERVOIR 090991
DIRT RD BRDG .1 MI NE OF ID RANCH
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/07	11 00		33.600	2.000	0.035	0.010	0.220
74/11/05	10 30		14.600	1.200	0.030	0.017	0.070
75/05/02	10 00		7.500	1.850	0.040	0.045	0.290
75/06/03	10 40		2.100	1.600	0.020	0.030	0.300
75/06/20	15 00		4.100	1.450	0.015	0.020	0.160
75/07/07	10 20		5.600	1.100	0.020	0.035	0.200
75/09/11	10 24		18.900	1.900	0.035	0.010	0.100

STORET RETRIEVAL DATE 76/08/05

5610C1
42 02 47.0 106 57 32.0 4
O'BRIEN CREEK
56 7.5 SEMNO DAM SW
T/SEMINOE RESERVOIR 090991
SEMINOE RD BRDG 2 MI ESE OF ID CAMP
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/07	10 00		0.040	1.100	0.022	0.032	0.040
74/11/05	10 05		0.016	0.900	0.025	0.025	0.040
75/05/02	12 00		0.010	0.550	0.020	0.010	0.015
75/05/21	15 40		0.040	1.000	0.055	0.025	0.080
75/06/03	10 20		0.002		0.030	0.270	
75/06/19	10 00		0.020	0.850	0.010	0.015	0.040
75/07/07	10 00		0.015	0.200	0.065	0.075	0.110
75/09/11	10 00		0.055	2.000	0.030	0.075	0.180

STORET RETRIEVAL DATE 76/08/05

561001
42 05 35.0 106 44 35.0 4
SAYLOR CREEK
56 7.5 SCHNEIDER RG
T/SEMINOE RESERVOIR 090991
SEC RD BRDG 1.5 MI NW OF EVANS RANCH
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/05	13 00		0.013	0.300	0.010	0.020	0.040
74/12/01	14 10		0.320	1.700	0.027	0.017	0.060
75/05/04	10 40		0.270	0.450	0.030	0.025	0.070
75/05/20	10 30		0.145	1.650	0.040	0.035	0.190
75/06/03	16 00		0.020	0.950	0.015	0.040	0.110
75/06/19	14 50		0.070	0.750	0.020	0.030	0.110
75/07/07	16 00		0.100	1.800	0.200	0.065	0.130
75/08/04	15 00		0.090	1.050	0.050	0.030	0.060
75/09/11	12 10		0.145	1.300	0.025	0.025	0.075

STORET RETRIEVAL DATE 76/08/05

5610E1
42 03 35.0 106 42 45.0 4
AUSTIN CREEK
56 7.5 SCHNEIDER RG
T/SEMINOE RESERVOIR 090991
SEC RD BRDG .6 MI S OF MATSON RANCH
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/07	13	30	0.012	0.500	0.015	0.015	0.030
74/11/05	13	15	0.024	0.500	0.010	0.020	0.020
75/05/04	10	20	0.210	0.500	0.020	0.020	0.070
75/05/20	10	40	0.130	1.800	0.045	0.025	0.160
75/06/03	16	20	0.020	1.200	0.030	0.020	0.100
75/06/19	15	10	0.025	0.750	0.015	0.015	0.080
75/07/07	16	30	0.030	1.200	0.130	0.015	0.050
75/08/04	15	15	0.015	0.800	0.030	0.015	0.030
75/09/11	13	00	0.035	0.700	0.020	0.015	0.030

STORET RETRIEVAL DATE 76/08/05

5610F1
42 00 37.0 106 30 45.0 4
MEDICINE BOW RIVER
56 7.5 TE RANCH
T/SEMINOE RESERVOIR 090991
SEC RD BRDG 13 MI N OF HANNA
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/07	15	00	0.504	0.900	0.025	0.005K	0.015
74/11/05	14	10	1.600	0.500	0.020	0.005	0.040
74/12/01	15	30	1.490	1.200	0.040	0.010	0.030
75/01/07	11	20	0.750	1.300	0.040	0.005K	0.020
75/03/03	14	30	0.550	1.700	0.105	0.020	0.110
75/04/04	14	00	0.710	1.450	0.045	0.010	0.090
75/05/04	09	40	0.270	1.000	0.040	0.020	0.190
75/05/20	09	35	0.095	2.500	0.045	0.025	0.580
75/06/03	17	10	0.200		0.025	0.030	0.262
75/06/19	15	45	0.075	1.050	0.010	0.015	0.240
75/07/07	17	10	0.025	1.000	0.060	0.010	0.200
75/08/04	15	55	0.030	2.500	0.055	0.005K	0.040
75/09/11	14	13	0.025	0.800	0.035	0.005	0.050

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/05

5610G1
42 01 43.0 106 31 35.0 4
TROUBLESOME CREEK
56 7.5 TE RANCH
T/SEMINOE RESERVOIR 090991
DIRT RD BRDG JUST N OF CAMBELL RANCH
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/05	14 00		0.240	1.000	0.035	0.015	0.200
74/12/01	15 00		0.390	1.500	0.060	0.010	0.080
75/05/04	09 55		0.240	1.300	0.055	0.020	0.120
75/05/20	09 45		0.140	4.800	0.190		0.200
75/06/03	16 15		0.055	2.600	0.030	0.020	0.630
75/06/19	15 30		0.060	0.950	0.010	0.015	0.170
75/07/07	17 00		0.030	1.900	0.330	0.020	0.110
75/08/04	15 40		0.025	0.550	0.025	0.005	0.060
75/09/11	13 30		0.060	0.800	0.030	0.015	0.080

STORET RETRIEVAL DATE 76/08/05

5610XA NO5610XA P007850
41 47 15.0 107 13 30.0 4
RAWLINS
56 7.5 RAWLINS
T/SEMINOE RES. 090991
SUGAR CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
75/02/18	12	40	1.120	7.000	0.160	1.050	1.700	1.500	1.460
75/03/19	12	30	1.200	5.200	0.050K	1.250	2.300	1.550	1.500
75/04/21	12	00	0.500	7.000	0.130	1.850	2.400	1.600	1.400
75/05/14	13	00	0.150	6.100	0.240	1.300	1.900	1.450	1.600
75/06/10	12	40	0.400	4.400	0.050K	1.200	1.750	1.400	1.500
75/07/01	12	45	0.025	6.900	0.025K	1.300	1.900	1.550	1.600
75/07/25	12	40	0.025	6.300	0.025K	1.000	1.600	1.600	1.550
75/08/26	12	30	0.075	5.400	0.025K	1.350	1.700	1.600	1.550
75/09/25	13	30	0.050	7.600	0.118	1.650	2.000	1.600	1.450
75/10/30	12	30	0.450	6.100	0.025K	1.500	1.500	1.400	1.300
75/12/04	15	00	0.300	22.000	6.000	2.400	4.300	1.200	1.300
76/01/14	14	00	1.000	12.000	0.025K	1.150	2.300	1.100	1.300
76/02/10	13	30	1.250	12.000	0.038	1.050	2.000	0.900	1.400

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/05

5610FA PD5610FA P000406
41 56 00.0 106 12 00.0 4
MEDICINE BOW
56 15 COMO RIDGE
T/SEMINOE RESERVOIR 090991
MEDICINE BOW RIVER
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
75/02/11	16 00		0.080	24.550	11.600	7.850	8.500	0.001	
75/03/10	15 30		0.080	17.000	6.850	8.000	8.200	0.001	0.001
75/04/29	14 45		0.050	14.000	0.350	8.500	9.340	0.002	0.002
75/07/16	15 45		0.075	7.400	0.500	0.850	1.350	0.014	0.015
75/07/31	15 45		0.075	21.000	0.150	1.570	4.900	0.022	0.019
76/01/05	14 30		0.050	30.000	10.500	8.400	11.000		